Let g be the mean anomaly;
ϕ be the angle of excentricity;
i be any positive integer number.

Put $\beta = \tan\frac{\phi}{2}$, $\mu = i\cos^2\frac{\phi}{2}$,

$$P_i = 1 + \mu + \frac{\mu^2}{2} + \frac{\mu^3}{2.3} + \&c. + \frac{\mu^i}{2.3\ldots i} \qquad Q_1 = 1 - \mu,$$

$$P_{i+1} = P_i + \frac{\mu^{i+1}}{2.3\ldots i+1} \qquad Q_2 = Q_1 + \frac{\mu^2}{2},$$

$$\&c \qquad Q_3 = Q_2 - \frac{\mu^3}{2.3},$$

&c.

Then the Equation of the Center

$$= (1-\beta^2)\Sigma_1^\infty \frac{2}{i}\left\{P_i.\beta_i + P_{i+1}.Q_1.\beta^{i+2} + P_{i+2}.Q_2.\beta^{i+4} + \&c.\right\}\sin ig.$$

The analysis which has led me to this, and the form of this result, are by no means peculiar to the Equation of the Center only, but apply to all functions which it is necessary to develope in series proceeding by sin ig or cos ig.

2. "An Experimental Inquiry undertaken with the view of ascertaining whether any, and what signs of Current Force are manifested during the organic process of Absorption (Lacteal) in living animals."—Part II. By H. F. Baxter, Esq. Communicated by Dr. Todd, F.R.S. &c. Received October 29, 1852.

In the experiments related in this paper, it is shown that when the electrodes of a galvanometer are brought into contact, one with the mucous membrane of the intestine, and the other with the chyle flowing from the lacteal of the same part, an effect upon the needle occurs indicating the chyle to be *positive*. The effects may be partly due to the changes which take place during *secretion*, the mesentery acting as a conducting body; this supposition however will not negative the conclusion that the effects may be attributed, in some measure at least, to the changes which occur during lacteal absorption.

3. "An Experimental Inquiry undertaken with the view of ascertaining whether any, and what signs of Current Force are manifested during the organic process of Assimilation in the Muscular and the Nervous Tissues in living animals."—Part III. By H. F. Baxter, Esq.

§ I. *On the existence of Current Force in the Muscular Tissues.*

After relating the conclusions arrived at by Matteucci in reference to the origin of the *muscular current*, the author endeavoured to obtain more direct evidence by forming a circuit between the muscular tissue and the venous blood; the effects however were but slight, they nevertheless indicated the *tissue* and the *venous* blood

to be in opposite electric states. The results of the experiments tend to confirm the inferences of Matteucci.

§ II. *On the existence of Current Force in the Nervous Tissues.*

After referring to the results obtained by Pacinotti, Puccinotti Matteucci, and Du Bois Reymond, experiments are related in which it is shown that if one electrode be inserted into the substance of the brain, and the other be brought into contact with the blood flowing from the internal jugular vein, an effect upon the needle occurs indicating the blood to be *positive*; an effect also was easily obtained if the latter electrode was placed in contact with any other part of the animal, such as the muscles. Reasoning from the results obtained, combined with physiological evidence, it was considered that they tend to establish the conclusion that the effects are due to the changes which occur during the organic process of assimilation or nutrition.

4. "On the Theory of Waves." By Andrew John Robertson, Esq. Communicated by the Rev. Henry Moseley, M.A., F.R.S. &c. Received September 6, 1852.

The author remarks that in the seventh volume of the Cambridge Philosophical Transactions, Mr. Earnshaw has a paper on the Mathematical Theory of the Waves of Translation, and that the objection to the theory therein given has been pointed out by Professor Stokes in a Report to the British Association, namely, that it requires a mathematically sudden generation and destruction of motion. Previously to his having an opportunity of reading Mr. Earnshaw's paper he had considered the subject in a manner entirely different (Phil. Mag. Dec. 1850, March 1851). The analysis he then employed was not however such as to lead to results sufficiently general, and he has in consequence now employed a higher analysis, in the application of which he acknowledges himself indebted to Mr. Earnshaw's paper for considerable assistance.

Taking the results deduced by Mr Scott Russell from his experimental inquiry, as the basis of his investigation, the author assumes, —1st, that the horizontal motion, produced by the passage of a wave, in every particle of any vertical column is the same; and 2nd, that the velocity of transmission is uniform. On these principles he deduces the value of c, the velocity of transmission,

$$c=(h\pm 2k)\sqrt{\frac{g}{h\pm k}};$$

in which h is the depth of the undisturbed water; $2k$ is the height of a positive and the depth of a negative wave; and g the accelerating force of gravity. Hence it appears that the velocity is greater for a positive than for a negative wave in the same channel.

Comparing this result with Mr. Scott Russell's experiments, it appears that on fourteen experiments of positive waves, the total error is $3\frac{1}{2}$ per cent. on the sum of all the velocities; and that on sixteen experiments of negative waves, the error is scarcely 2 per cent. on the sum of all the velocities. The author infers that it may